

THE TROUBLE WITH "BOBOS," *PARALEUCOPIS MEXICANA*
STEYSKAL, AT KINO BAY, SONORA, MEXICO
(DIPTERA: CHAMAEMYIIDAE)

ROBERT L. SMITH

Department of Entomology, University of Arizona, Tucson, Arizona
85721.

Abstract.—*Paraleucopis mexicana* Steyskal from Kino Bay, Sonora, Mexico, is annoying to humans. The flies have muscoid mouthparts and do not bite. They are parasitic on the eyes of marine birds that inhabit an island in Kino Bay, and their larvae may develop in bird nests. Data on the distribution and biology of *P. mexicana* suggest that the genus has recently and dramatically diverged from other members of the family Chamaemyiidae.

In April 1978, the Department of Entomology at the University of Arizona was requested to assist a government-sponsored development corporation (Patronato del Fraccionamiento de Bahia Kino) in the state of Sonora, Mexico, on a problem with an unidentified annoying fly in the Kino Bay (Bahia Kino) area on the Gulf of California. Accordingly, I visited Kino Bay on 23 April, 19 May, and 26 December 1978, and again on 5 April 1979. During my first visit, I found only one species of irritating fly in significant numbers. This was an undescribed species in the chamaemyiid genus *Paraleucopis*. George Steyskal, Systematic Entomology Laboratory, USDA, confirmed this determination and has described the species as *Paraleucopis mexicana* in the preceding paper (Steyskal, 1981). This short communication reports some habits of the adult flies and delineates the problem at Kino Bay.

LOCATION

Kino Bay is a developing resort area on the west coast of Sonora, Mexico, approximately 110 km west of Hermosillo. The developed shore is approximately 12.5 km long and faces south. It is bordered by a rocky point on the west (Cerro Prieto) and the village of Old Kino (Pueblo de Kino) on the east. A small (1 × 2 km), sparsely vegetated rocky island (Isla de Alcatraz) is situated about 1 km offshore to the south of Old Kino. The island is home and nesting ground for a variety of marine birds including brown pelicans, double crested cormorants, yellow-crowned night herons, Heermann's

gulls, western gulls, frigate birds, oystercatchers, and ospreys. In addition to the birds, Alcatraz is inhabited by two species of very large lizards, the San Esteban Island chuckwalla, and the black chuckwalla (Keasey 1976). This island and its vertebrate fauna seem to figure prominently in the biology of *Paraleucopis mexicana*.

THE PROBLEM

The flies, "bobos" as they are referred to by natives of this region, are attracted to humans. They have the habit of walking on exposed skin and hair with particular affinity for the face and eyes. These insects do not bite, but move constantly on human skin and are extremely annoying. It is not uncommon for more than 50 individuals to simultaneously swarm about and assemble on the face and head of a person (Fig. 1). Brushing the flies away provides but a few seconds of relief. They are extraordinarily persistent and quickly resettle after being disturbed. Consequently, it is unpleasant to walk or stand fully clothed on the beach when the flies are active. During their peaks of activity, all but the most tolerant sunbathers abandon the beach for shelter. The flies are most abundant around Easter at the height of the Mexican tourist season. The Patronato regards the activities of these insects to be a significant deterrent to tourism and development in the Kino Bay area.

SEASONAL APPEARANCE AND DIEL ACTIVITY PATTERNS

Interrogation of native Mexicans and Seri Indians that have inhabited this region for generations revealed that the bobos have appeared in mid-March for as long as they can remember. Natives reported that the flies always vanish by mid-June. My observations confirm these reports.

The flies are inactive at night. They begin to fly each morning when air temperatures reach about 26°C. During my visits, this occurred between 0700 and 0900 hours. The flies are most active and annoying in warm still air from mid-morning to late afternoon. They have reduced activity in breezes from about 8 km/hr and cease flying when winds reach an estimated 24 km/hr.

Throughout the night and when breezes are in excess of 24 km/hr, the flies seek protected roosts where they rest until morning or calm. On the developed portion of the beach, *P. mexicana* commonly roosts on the underside of beach house and condominium balconies (Fig. 2). On the island (Alcatraz), rocky caves and overhangs are utilized as natural roosting sites, as well as the undersides of palm frond cabanas constructed along the north-facing island beach.

DISTRIBUTION OF ADULT FLIES

Bobos in the Kino Bay area were distributed only along the shore. Their numbers declined steadily inland to a distance of about 1.5 km. None were found during several visits 5 km inland. Native fishermen unanimously ex-



Figs. 1, 2. *Paraleucopis mexicana*. 1, On the face of a boy. 2, Roosting on the under surface of a beach house.

pressed their belief that the bobos come from the island (Alcatraz) and indicated that the flies are annually first observed in its vicinity. G. C. Steyskal (personal communication) reports that the U.S. National Museum collection contains large series of this species taken on a number of islands in the Gulf of California. Consistent with these reports, I always found relatively much higher populations on Alcatraz as compared with the Kino beach. It seems possible that flies on the coast have been displaced from the island by onshore winds. The roosting behavior of these flies in response to winds may be an adaptation to minimize the possibility of their being disadvantageously dispersed from islands.

ADULT FOOD AND FEEDING HABITS

Three days during my April 1978 visit to Kino Bay were devoted to a survey of the adult flies' feeding habits. In the developed areas, I observed flies to feed on insects smashed on automobile grills and apparently on the secretions of human skin, hair, and eyes. They were also extremely fond of human blood and always surrounded a superficial wound to feed on it (Fig. 3). Among the potential food sources definitely not utilized by the flies were vertebrate carcasses including seal, dolphin, sea birds, bony fish and sharks, and marine crustaceans such as shrimp and crabs, all of which were abundant on the island and Kino Bay beaches. *Paraleucopis mexicana* likewise



Figs. 3, 4. *Paraleucopis mexicana*. 3, Feeding on human blood at the site of a superficial wound on a finger. 4, Head showing oral disc (scanning electron micrograph).

was not associated with marine algae, human or other animal feces, or garbage in the village of Old Kino.

Feeding habits of this species seem to be most closely associated with marine avifauna and lizards on the island. Every bird and lizard I observed on the island, including adults and immatures of all the aforementioned species, were being swarmed by the flies, and each individual inevitably had a ring of flies around its eyes. These were obviously feeding on eye secretions. The birds seemed almost defenseless against this parasitism. Only occasionally did they attempt to shed their parasites by shaking or brushing their heads against their shoulders. These actions provided the birds only a few seconds of respite. For the most part, birds tolerated the feeding flies.

Bobos have a sponging lapping (muscoïd) type labellum with a rather broad oral disc (Fig. 4). It does not appear that the pseudotracheae on the oral disc are furnished with spines as is the case with certain eye-feeding Oscinidae (Graham-Smith, 1930). Some oscinids have been reported to ulcerate human eye mucosae and to vector microbes causing conjunctivitis, but a local physician, Dr. Augustine Araiza, told me he had not observed an increase in the incidence of conjunctivitis following the annual bobo emergence in Kino Bay.

COURTSHIP, MATING, AND REPRODUCTIVE CONDITION OF FEMALES

Mating behavior was frequently observed among flies on human skin. Courtship was quite abbreviated. Typically, a male approached a potential mate, stroked her abdomen with his front legs and immediately mounted. Although males were repeatedly observed riding the backs of females, they rarely (<1%; $n > 50$) succeeded in copulating. It was usual for males to remain mounted for less than 10 seconds if rejected by the female. Pairs that succeeded in copulation remained coupled for as long as two minutes.

A 30-second head sweep taken on 23 April 1978 produced a 3:1 female to male sex ratio. Fifty females from this sample were crushed on a microscope slide and their eggs counted. Thirty-six of the 50 contained $\bar{x} = 17.76 \pm 5.46$ SD mature eggs, 11 contained only immature eggs (not counted), and three contained no eggs.

Oviposition by this species was never observed although I actively searched for oviposition sites. Again a variety of potential sites were examined. They included those mentioned as possible feeding sites as well as mud flats, tidal pools, vegetation, plant litter, and bird nests.

SPECULATION ON THE LIFE HISTORY

No bobo larvae were found during any of my visits to Kino Bay and Alcatraz Island. This was particularly disappointing because location of larvae was the principal objective of my second, third, and fourth trips. I concentrated my search on the island, looking principally at birds' nests and

in and under mats of guano. One of two previously described species in this genus, *Paraleucopis corvina* Malloch, was taken from birds' nests (Malloch, 1913; Wheeler, 1959). This, coupled with my observations on the ecological dependence of adult bobos on marine birds, and their seasonal first appearance on the island, suggested that bird nests would be the place to look for larvae. In spite of my failure to find larvae in bird nests, I have not abandoned this bias. It could be that my visits occurred before the eggs of *P. mexicana* had hatched. The brief three-month appearance of adults suggests that the species is univoltine. If this is the case, eggs may diapause for approximately 9–10 months of the year. Hatching may be synchronous with the nesting of one or more species of marine birds on the island.

DISCUSSION

Both the distribution of species and what is known of the biology of *Paraleucopis* suggest that the genus has recently and dramatically diverged from the other chamaemyiid genera. All of the genera except *Pseudodinia* and *Paraleucopis* are cosmopolitan. *Pseudodinia* is exclusively North American, and the three described species of *Paraleucopis* are from the Southwestern United States and Mexico (Steyskal, 1971, 1981, and personal communication).

Four of seven genera that comprise the family have larvae predaceous on aphids, mealy bugs, and scale insects (see Sluss and Foote, 1971), and adults belonging to all of the genera except *Paraleucopis* have been observed to feed on aphid honeydew and nectar (Oldroyd, 1964; Sluss, personal communication). These larval and adult habits are apparently ancestral characteristics for the family.

Members of the genus *Paraleucopis* are biologically quite different. *Paraleucopis corvina* has been independently associated with a crow's nest in New Mexico (Malloch, 1913), and a great horned owl's nest in Texas (Wheeler, 1959). Although not explicitly stated in the aforesaid papers, it seems that the larvae of this species probably develop in birds' nests. *Paraleucopis boydensis* Steyskal was described from specimens "that were hovering about the faces and getting into the eyes of workers" at the Boyd Desert Research Center, Riverside Co., California. Finally, *P. mexicana* combines these characteristics. It is parasitic on marine birds, suspected of breeding in bird nests, and is annoying to humans. I plan to continue my search for the larvae of *P. mexicana* and would certainly welcome any information on this problem from entomologists and biologists working on islands in the Gulf of California.

ACKNOWLEDGMENTS

I thank the Patronato del Fraccionamiento de Bahía Kino and especially Lic. Javier Morales Valdez for his generous assistance during my visits to

Kino Bay. Carl Olsen identified the flies to genus and George Steyskal confirmed our determination and provided additional information on the species. Greg Lanzaro, Jill Smith, and Scot Smith all assisted in the field. This research was supported in part by Arizona Agric. Exp. Stn. Project 2014-4161-17, Arthropods of Public Health Importance. Ariz. Agric. Exp. Stn. M.S. No. 3035.

LITERATURE CITED

- Graham-Smith, G. S. 1930. The Oscinidae (Diptera) as vectors of conjunctivitis, and the anatomy of their mouth parts. *Parasitology* 22: 457-467.
- Keasey, M. S. 1976. The wildlife of Alcatraz island. *Pac. Discovery* 24: 1-9.
- Malloch, J. R. 1913. A synopsis of the genera of Agromyzidae with descriptions of new genera and species. *Proc. U.S. Natl. Mus.* 46: 127-154.
- Oldroyd, H. 1964. The natural history of flies. Weidenfeld and Nicolson, London. 324 pp.
- Sluss, T. P. and B. A. Foote. 1971. Biology and immature stages of *Leucopis verticalis* (Diptera: Chamaemyiidae). *Can. Entomol.* 103: 1427-1434.
- Steyskal, G. C. 1971. The genus *Paraleucopis* Malloch (Diptera: Chamaemyiidae) with one new species. *Entomol. News* 82: 1-4.
- . 1981. A new "bobo" fly from the Gulf of California (Diptera: Chamaemyiidae: *Paraleucopis mexicana*). *Proc. Entomol. Soc. Wash.* 83: 403-405.
- Wheeler, M. R. 1959. Notes on some flies reared from birds' nests. *Southwest. Nat.* 4: 154.